Award Number: DAMD17-03-2-0017

TITLE: Development of the Integrated Info Tech System

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REPORT DATE: January 2006

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
01-01-2006	Annual	15 Feb 2005 - 14 Feb 2006

4. TITLE AND SUBTITLE
Development of the Integrated Info Tech System

5a. CONTRACT NUMBER

5b. GRANT NUMBER
DAMD17-03-2-0017

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
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5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

University of Pittsburgh Medical Center
Pittsburgh, PA 1521 3

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
NO ABSTRACT PROVIDED

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
					USAMRMC
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER** *(include area code)*
U	U	U	UU	57	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

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Introduction

The IMITS: Information and Clinical Technologies for the Advancement of Healthcare is focused on implementation of advanced technology solutions that eliminate inefficiencies, increase utilization, and improve quality of care for active duty forces. The work on this project has focused on the development and implementation of prototype telemedicine systems and advanced technology applications at United States Air Force bases. Emphasis has been placed on the development of sound evaluation methodologies for each of the sub-projects with special attention to the areas of cost effectiveness and end-user satisfaction within the AFMS.

Body

Teleradiology

Develop and implement a symmetrical load-balancing distributed radiology workflow infrastructure at Wilford Hall Medical Center (WHMC).

The distributed radiology workflow research project was put on hold for over 6 months while the program office, Air Force Surgeon General Modernization Directorate (SGR) and the University of Pittsburgh Medical Center (UPMC) negotiated the core system architecture for the distributed radiology workflow prototype. Upon agreement, by UPMC and SGR, of the core system architecture the original Statement of Work was revised to reflect the core system architecture and the processes in which to develop the distributed radiology workflow prototype. The latest version of the Statement of Work was submitted in September 2005. This new Statement of Work was submitted in the IMITS FY05 Teleradiology Proposal.

Develop and implement a radiology integrated dictation system (IDS) at Wright-Patterson Air Force Base Medical Center.

Based upon mutual agreement between UPMC and Wright-Patterson Air Force Base Medical Center this project has been replaced by the Digital Imaging and Communications in Medicine (DICOM) Modality Worklist Services project.

The following projects were completed at the request of and in support of Wright-Patterson Air Force Base (WPAFB) Medical Center. These tasks were completed in addition to or in place of the original statement of work.

Support Wright-Patterson AFB Medical Center with Stentor 3.2.2 upgrade (3.0 to 3.2.2).

The Stentor 3.2.2 upgrade plan and implementation began in February 2005 and was completed in August 2005. The upgrade to Stentor 3.2.2 provided users with additional functionality such as improved Hanging Protocols, updated navigation rectangles, play of multi-slice studies in cine loop mode, improved measurement tools and improved image overlays. A Stentor 3.2.2 new feature document is available upon request.

Develop and implement Emergency Department (ED) Clinical View wrapper application for Wright-Patterson AFB Medical Center.

UPMC developed an Emergency Department (ED) Clinical View process for ED physicians to log to and review report discrepancies between the ED physician report and the Radiologist report. The ED Clinical View process was delivered to Wright-Patterson during August 2005.

Review, Select, Purchase, and Install DICOM Modality Worklist (DMWL) Services at Wright-Patterson AFB Medical Center

Wright-Patterson requested that DICOM Modality Worklist services be funded by UPMC in place of an Integrated Dictation System (IDS). DICOM Modality Worklist (DMWL) requirements were reviewed and drafted between UPMC and Wright-Patterson. These requirements were submitted to potential DMWL vendors. Wright-Patterson and UPMC personnel selected AGFA as the DMWL services provider based on AGFA's DMWL capabilities and current experience with the Air Force. As of this report, UPMC has submitted a purchase order with AGFA for DMWL services.

Purchase extended Stentor Maintenance through October, 2006 for Wright-Patterson AFB Medical Center

UPMC purchased two years of maintenance for the Stentor system at Wright-Patterson. The maintenance coverage extends through October 2006.

Establish a Training Program for Wright-Patterson System Administrators

This SOW was not contained in the original proposal. UPMC provided on-site Picture Archiving and Communications System (PACS) training at UPMC for two Wright-Patterson PACS Administrators. On-site training at UPMC was four days in duration. On-site training included PACS network review and monitoring, System architecture review and planning, help desk review and support, development observation, and PACS hardware configuration. Training of two Wright-Patterson PACS Administrators occurred during the months of August and September 2005.

Plan for Dynamic Workload Allocation Architecture

An initial Dynamic Workload Allocation site visit was coordinated, scheduled and held at Wright-Patterson during April 2005. Bi-monthly conference calls to plan for Dynamic Workload Allocation architecture at Wright-Patterson began in early May 2005 and continued through December 2005.

Evaluate the impact of implementation and usage of the prototype Stentor Image and Information Management System at Wright Patterson Medical Center.

Research is focused on user satisfaction, system functionality, and changes in timeliness, work efficiency and patient care. The study consists of surveys, interviews, site visits and diagnostic imaging statistics.

Progress

In August 2005, the system was upgraded to Stentor 3.2.2. This upgrade brings the system into compliance with general project objectives for system installation at Wright-Patterson.

Evaluation activities were conducted in alignment with project development activities. Baseline surveys, interviews and site visits were conducted prior to Stentor's implementation, intermittently, and post 3.1. Post survey data was collected for Stentor 3.1 in January 2005 and post interviews were conducted in June 2005. Post 3.2.2 surveys and interviews are scheduled for January 2006. Final interview and site visit data will contribute to an understanding of the impact of Stentor at Wright-Patterson.

Surveys

Baseline surveys were completed in conjunction with Stentor staff training conducted in May 2003. Pulse surveys (i.e., intermittent abbreviated surveys) were completed every few months across a subset of users to track system acceptance and potential barriers to adoption and use. Post 3.1 surveys were conducted in January 2005 and post 3.2.2 surveys are scheduled for January 2006.

Table: Surveys: Time Points and Users

Users	Time Point 1	Time Point 2	Time Point 3	Time Point 4	Time Point 5	Time Point 6	Time Point 7
	Baseline Surveys		Pulse Surveys			Post Survey 3.1	Post Survey 3.2
	4/2003	12/2003	3/2004	6/2004	9/2004	1/2005	1/2006*
Radiologists	4	4	4	4	3	5	---
Technologists	23	21	3	2	16	18	---
Clinicians	3	2	6	3	3	10	---
Others	2	2	2	0	2	1	---

* Projected date of future survey implementations.

See Appendices: Teleradiology Survey Findings

Interviews

Pre-implementation interviews were conducted with a subset of radiologists (n = 5), technologists (n = 4) and clinicians (n = 4). Informal interviews were also conducted with two key project administrators at Wright-Patterson who were retiring from the Air Force. Interviews are undergoing comprehensive analysis and will contribute to an understanding of barriers, supports and lessons learned from the project.

Site Visits
Researchers have made eight site visits to Wright-Patterson AFB to conduct surveys and discuss usage and satisfaction with staff that routinely interfaces with Stentor.

Diagnostic Imaging Statistics
Diagnostic Imaging Department productivity is being tracked based on CHCS database statistics. This information will parallel project implementation and system upgrades.

Workflow Analysis
Site visits and interviews contributed to a workflow analysis of staff practices and interactions with the diagnostic imaging systems. Changes in staff roles and responsibilities in processing diagnostic images are being tracked across systems.

IRB Approval Process
The research is being planned and conducted in a manner consistent with the goals of the project. Evaluation studies are being conducted with the full approval of institutional review boards (IRBs) at each institution and medical center involved in the conduct of the studies. The IRB review process has proven to be a time-consuming process.

Teleaudiology

Conduct Feasibility Study to evaluate remote access, monitor, and adjust cochlear implants.

Individuals from Wilford Hall Medical Center (WHMC) and UPMC were selected for the project team based on their expertise in Audiology. The project team contacted three cochlear implant manufacturers within the United States and requested their participation on this project. All three manufacturers agreed to participate on the project. The manufacturers are Cochlear Americas, Advanced Bionics, and Med-El. Intent to participate letters were acquired from the manufacturers. A detailed evaluation by the project team was conducted to document the current requirements and procedures with regard to cochlear implant mapping. The project team and the manufacturers have outlined a proposed solution for remote cochlear implant mapping. Remote cochlear implant mapping will use video conferencing equipment and a form of remote control software. The manufacturers will demonstrate the proposed solution to the project team in the first quarter of 2006. A needs assessment and a gap analysis will be provided to the office of the Surgeon General of the US Air Force upon conclusion of this demonstration.

The proposed remote cochlear implant mapping solution will require FDA approval. The FDA approval process requires testing and documentation from only the manufacturers. Testing of this solution will require a minimum of six months. The testing will only be conducted by the manufacturers and without human subjects, to meet FDA requirements. This process will be conducted in the second and third quarter of 2006. The manufactures expect to present their results to the FDA in the fourth quarter of 2006 for approval.

Telepathology

Clinical Implementation of Whole Slide Imaging (WSI)

This project was designed to not only demonstrate the utility of WSI as a technology, but also to show that WSI can be used reliably in the real-world, clinical environment. Over the past year, UPMC conducted controlled trial validation studies assessing the feasibility and functionality of using whole slide imaging to perform Quality Assurance and Primary Diagnosis in clinical pathology. A third study examining the use of WSI for immunohistochemical stains will be completed in February 2006.

Human Pathology (journal) accepted the Quality Assurance manuscript for publication. Findings from the Quality Assurance study were presented to professional colleagues at the 2005 Advancing Practice, Instruction and Innovation through Informatics Conference (APIII).

The Primary Diagnosis manuscript was submitted to *BMC Clinical Pathology* (journal published by BioMedical Central) and is currently being revised for publication as per peer review comments. Abstracts of the Primary Diagnosis study were accepted for presentation at the 2006 United States and Canadian Academy of Pathology (USCAP) Conference and the 2006 American Telemedicine Association (ATA) Conference.

A final report is being developed that will detail the advantages and limitations of clinical implementation of WSI with recommendations for advancing technologies for image capture robots. Standards for barcode labeling, image storage and archiving and related integrated processes will lay the groundwork for developing a strategic plan for implementation of WSI at UPMC and in the US Air Force.

Improve Whole Slide Imaging Technology Performance

In this project UPMC is examining three rapidly evolving, critical aspects of whole slide technology: 1) advanced WSI capture systems and image formats, 2) the effect of network configurations on performance and 3) the design of faster, more effective virtual microscope viewers. The goal is to have the most up to date, effective and compatible technologies for the UPMC/US Air Force WSI distributed pathology system(s).

At the end of 2005, UPMC established a protocol for assessing image quality and clinical functionality of advanced image scanning systems. Beginning in November 2005, select vendors are coming to UPMC to demonstrate their systems and participate in validation testing. Each vendor's system will be reviewed by a panel of pathologists with an outcomes report to follow. Vendors will also be invited to participate in a validation study to be conducted in 2006.

Through implementation of the controlled trial validation studies conducted over the past year, clinical applications have been tested and subject experiences and perceptions are contributing to significant changes in technology and recommendations for practice. Testing of systems included the evaluation of image quality, throughout and compatibility with the UPMC environment. Based on the results of the quality assurance study, some system modifications were implemented

with satisfactory results. A comprehensive report/plan will be completed by the end of February 2006 that will be used to scale-up the telepathology system at UPMC, and will form the basis for a similar system in the US Air Force.

Integration of Advanced Algorithm

Compression and focus were identified as major issues in the controlled trial validation studies that were conducted. Based on these findings, research centered on the effects of compression on WSI quality for optimal compression methods with JPEG 2000, keeping high quality images with small file sizes and work continues on improvements for focus measurement algorithms. Manuscripts on compression and focus are being prepared and will be submitted for publication in professional journals.

Integrated static, robotic, and whole slide Telepathology network

Strides were made towards linking the sites for telepathology for use with consultation and education. UPMC participated in Telepathology "Case of the Week" sessions held with Keesler, Eglin, and Travis Air Force Bases. Each site, in turn, prepared and presented interesting cases that were shared in advance and viewed and discussed collectively via the Telepathology site on AF Knowledge Now through the AF Portal. Participants were gaining experience and confidence with consultative processes but activities were put on hold based on impact of the Hurricane Katrina at Keesler AFB. The "Case of the Week" sessions will resume in January 2006. A telepathology abstract that used this process to facilitate consultations was accepted as a poster presentation at 2006 ATA Conference.

Evaluation

Evaluate the impact of implementation and usage of WSI to perform Quality Assurance, Primary Diagnosis, and the value of using Immunohistochemical (IHC) Stains.

Quality Assurance

Progress
Twenty-four pathology cases with 47 diagnostic parts and 391 slides were presented. The evaluation team met with project management and study pathologists to reach a consensus on each case. The evaluation team provided analysis to be used for publication.

Interviews
The evaluation team provided preliminary findings and conducted focus groups de-briefing interviews with study pathologists and the principal investigator.

IRB Approval Process
Two separate modifications were submitted to University of Pittsburgh IRB. These were to change approved exempt study to include additional diagnostic information in reports of findings and to change evaluation PI.

Primary Diagnosis

Progress
Twenty-five pathology cases with 31 diagnostic parts were presented. The evaluation team met with project management and study pathologists to reach a consensus on each case and then they presented, for the first time, the original diagnostic report. The evaluation team provided analysis to be used for publication.

Interviews
The evaluation team provided preliminary findings and conducted focus groups de-briefing interviews with study pathologists and the principal investigator.

IRB Approval Process
Exempt study request submitted to University of Pittsburgh IRB. These were two subsequent modifications made during the year one to include additional diagnostic information in reports of findings and the other to change evaluation PI.

Immunohistochemistry

Progress
This study has three phases, H&E Glass Slide, Virtual Slide (WSI) and H&E with IHC Glass Slides. Phase one was completed at the end of 2005 and results were sent to the project PI and study pathologists.

IRB Approval Process
This study falls under the Primary Diagnosis IRB exemption.

Perform a needs assessment for a Pacific Rim Telepathology initiative, leveraging the existing Telepathology IMITS program.

The University of Hawaii performed an initial informal assessment of the AFMS and AMEDD in the Pacific Rim. There was little interest in setting up a telepathology network. There were two primary reasons sited were for the reluctance to move ahead. A requirement of telepathology implementation is the availability of a technician to prepare the slide. In many locations, this resource does not exist. Time difference was also sited as a factor. Dynamic robotic telepathology is a real-time application. Health care providers need to be at the local and remote site simultaneously. This poses a logistics problem given the 8 hours time difference within the Pacific Rim. It was determined that this pilot should be put on hold pending the outcome of the trials at UPMC with whole slide imaging. WSI may provide a better solution for this region.

Extra-Corporeal Membrane Oxygenation (ECMO)

Perform a needs assessment and planning initiative to develop a Pediatric ECMO Center in Hawaii for the Pacific Rim, leveraging UPMC's extensive knowledge and experience in this area.

The University of Hawaii provided the leadership for this task. As stated the initial plan was to perform a needs assessment in the Pacific Rim to determine the feasibility of developing a regional Pediatric ECMO Center. This information would be used to seek additional funding to support the initiative. Simultaneous to this IMITS agreement being signed, funding for the ECMO center was appropriated to the Army in Hawaii to develop a Pediatric ECMO Center. Therefore the funding provided in IMITS was focused solely on planning.

An initial planning meeting was held in Hawaii in October 2004. The participants were UPMC, University of Hawaii, Wilford Hall Medical Center, Tripler Army Medical Center, Kaiser Permanente and Kapioloni Women's and Children's Hospital. A plan for moving forward was agreed upon. The Pediatric ECMO Center will be a joint military-civilian center. The physical location of the center has yet to be determined. Mark Ogino, MD from Kaiser was chosen to be the director of the center. The group planned additional small meetings in January and February with a full program meeting planned in March 2005 in Hawaii.

At the March 2005 meeting it was announced that Kapioloni would be the site for the ECMO Center. There was a demonstration of the simulation training capabilities and the ECMO equipment. Small group meetings were held to focus on administration, education, and training and perfusion. The group reviewed the BAA proposal guidelines with a plan to have the proposal submitted in June.

Over the next several months all partners wrote and revised their respective portions of the proposal. Over the summer the Army determined that the project would best be served if one of the other partners took the lead role. It was determined that the University of Hawaii would be the Prime contractor based on their prior experience with DoD award. A final proposal with UH as the lead was submitted in October 2005.

In August 2005, UPMC used additional funds that were available to support the purchase of ECMO equipment. It will be used for training and education purposes in preparation for the initiation of the program.

On December 16, 2005, comments from the peer review agency were received. The proposal will require significant revisions. The partners will meet in January to address this issue.

Simulation and Training

Advanced Medical Education

Advanced Simulation for Medical Education and Training in the Pacific Rim Develop Medical Education capability with advanced medical simulators, leveraging expertise of UPMC's WISER Institute.

A detailed evaluation of the University of Hawaii's (UH) simulation requirements was conducted by members of the UH and UPMC WISER Institute. The project team was able to develop a collaborative model to assist in the development of the UH simulation center. The collaborative team developed Memorandum of Agreement (MOAs) and licensing agreements to share curriculum and technologies. These agreements are pending approval upon completion of UH and UPMC officials' review. This collaborative process assisted in the design of the UH simulation center's hardware and software solution. This solution is compatible with the programs currently developed at the UPMC WISER Institute. The solution is in the final stages of the design and testing phase, and UH has begun their requisition of required hardware and simulator equipment. Upon approval of the MOAs and licensing agreements and the arrival of the required equipment, the system will be scheduled for implementation in the second quarter of 2006.

During this collaborative process, UPMC WISER Institute members were able to identify existing partnerships between Asia and UH. UPMC WISER Institute was able to leverage these partnerships to increase the UPMC WISER Institute exposure in Asia. Several members of the UPMC WISER Institute were invited to participate and present in the Annual Asia Pacific Military Medicine Conference in May 2005.

Simulation at Wilford Hall Medical Center

Conduct a "Needs Analysis" for incorporating simulation into the existing WHMC training programs

The project started in March 2005. Site visits were held at San Antonio area simulation centers: US Army Medical Department (AMEDD) Center & School (Ft. Sam Houston), Wilford Hall Medical Center (WHMC), Brooke Army Medical Center, Ft Sam Houston (BAMC), Expeditionary Medical Support (MEDS) training site, Brooks City Base, Defense Military Readiness Training Institute, Ft. Sam Houston (DMRTI), and University of Texas Health Science Center-San Antonio (UTHSC-SA). These visits were conducted to identify types of training provided, the capabilities of each center, and to analyze each center's ability to expand services to meet increasing demand. Sustainability issues were also noted. Problems identified during these site visits include lack of integration with training and education requirements, short term or part-time personnel support, and adequate space.

A meeting was held in April 2005 with Maj Gen Bruce Green, Commander WHMC, who asked that the project focus on incorporating simulation into required training at WHMC. This would include a center using high-fidelity mannequins and virtual reality surgical trainers, that would be

primarily Graduate Medical Education and Medical Readiness based. Also, basing the center at WHMC could help spread the use of simulation across the AFMS if outcome studies establish simulation as a valuable tool to conduct training.

The Simulation and Training Working Group was formed in April 2005. This committee consisted of LtCol Teri Dremsa (Primary Investigator), Capt (Dr) Elvin Cruz (Co – PI), Col (sel) Eleanor Avery (Graduate Medical Education), LtCol Patricia Alvoet (USAF School of Aerospace Medicine), LtCol Joanne Kirschbaum (Education & Training WHMC), and UPMC South Program Office personnel. The committee guides the overall direction of the program and identifies the best venue for the incorporation of simulation. The committee also approved the concept of establishing a pilot simulation center to identify, develop, and test programs that would benefit from simulation and to verify findings during the needs assessment.

The Pilot Simulation Center was started using loaner equipment from the Laerdal Corporation and Medical Educational Technologies, Inc (METI) and one METI HPS simulator owned by WHMC. The equipment needed to conduct training for various programs, such as monitors, defibrillators, ventilators, and furniture, was acquired through Defense Reutilization and Marketing Office (DRMO), Ft. Sam Houston-(surplus but useable military medical equipment is turned in here and available at no cost to other military programs) at no cost to either WHMC or the IMITS Congressional cooperative agreement. Space in the main building at WHMC was allocated by the WHMC leadership and WHMC Space Committee in the ICU area of the hospital. The pilot center has been in operation since July 2005.

Briefings and discussions were also held with WHMC Patient Safety Committee and the Chief of Hospital Services, the San Antonio Uniformed Services Health Education Consortium (SAUSHEC) Graduate Medical Education program directors and staff, the WHMC Medical Readiness Office, Readiness Skills Verification Program Managers, WHMC/UPMC Congressional Steering Committee, and WHMC Level 1 Trauma Center leadership and training staff. Suggestions from these groups are used during working group meetings to identify training opportunities that could be developed and used for data collection for the needs assessment. Methods for data collection include observations, discussions with stakeholders, training guidance, and literature reviews. Outcomes have included a study done on Pediatric Advanced Life support training outcomes and retention and reports from WHMC subsequently deployed to IRAQ following predeployment training.

The center has been growing steadily. Feedback has been very positive especially regarding "hands-on" skills practice compared to a classroom PowerPoint Presentation or briefing. The Pediatric residents have been using the center extensively to improve skills in the care of critically ill pediatric patients. The Pediatric ICU census has been steadily decreasing with less and less training availability on complex patients. The Pediatric ICU staff has also created a Conscious Sedation Verification Program using simulation of pediatric sedation cases. They have also used the simulation center for a resident study on compliance with PALS Protocols.

Readiness personnel have used the center for medical technician and nursing Readiness Skills Verification. In fact, the center will be used monthly to perform these checks on all skills rather than testing different skills on a tri-monthly rotating basis. The Emergency Department and

Surgical Intensive Care Unit have used the center for all required annual skills testing. The Trauma Department has developed a pre-deployment trauma course that teaches critical deployment care skills using the Simulation Center. This pre-deployment course is built on the Emergency War Surgery Course and the feedback has been extremely favorable. Currently, the WHMC Pilot Simulation Center is awaiting feedback from the participants that have just been deployed. This feedback will be used to adjust, add, or delete subjects in the course.

The needs assessment will be completed in mid-2006 and will incorporate findings from the pilot project. WHMC Stakeholders are trying to find funding that will continue this project past Dec 2006.

"Patient Transfer" Simulation Training

Develop an innovative educational "Patient Transfer" simulation course

A detailed evaluation of the UPMC Nursing's current training methods for the prevention of back-related injuries was conducted by members of the UPMC WISER Institute. The project team was able to obtain relevant information pertaining to the specific programs/training and the support structure required in preventing back-related injuries. From this evaluation, the project team was able to develop the course goals, objectives, curriculum, and educational tools. The course and the curriculum were incorporated in to the UPMC WISER Institute's SIMS application for both traditional and online training delivery methods. The course was designed for integration with high fidelity patient simulators and other mannequins designed for bio-mechanic and "patient" move simulations. Several evaluation and feedback methods were incorporated into the course materials. Evaluation methods such as: pre and post patient transfer observations, trainee performance assessment tools, learning system effectiveness methods, programs leadership and support evaluations, instructor evaluations, and satisfaction surveys will be used.

Upon completion of the course design, a research study protocol was developed to accurately observe the effects of the course on the nursing participants. The protocol outlined a control group and a treatment group. The control group will consist of one nursing unit that will only be supplied with tradition back injury prevention training through the Internet. The treatment group will consist of two nursing units that will receive the new course material. This protocol was approved by the University of Pittsburgh Institutional Review Board (IRB) in December 2006. This protocol will be submitted to the US Army Human Subject Review Board (HSRRB) as an "expedited study", for second level review. The project team has captured pre-training patient transfer moves and has begun the first round of participants in the course.

Telemental Health

Explore opportunity for development of advanced telehealth applications for the treatment of post-tramatic stress disorders in mass casualty situations.

This project was put on hold and subsequently recommended for closure. During the past year, the Statement of Work (SOW) was reviewed and revised to include disaster response efforts,

processes and lessons learned from Hurricanes Katrina and Rita. The SOW was also to include fine-tuned processes required to adequately capture clinical, therapeutic, and logistical challenges. The Air Force Medical Service (AFMS) selected the appointed Principal Investigator (PI) to fulfill a senior leadership development position resulting in the Telemental Health Project being placed in a "Hold" status for several months. Subsequently the project was recommended to be closed as another PI was not presented and approved by the Wilford Hall Medical Center Congressional Review Board.

Platelet Gel

Create a model to evaluate the efficacy of Platelet Gel Therapy on non-healing diabetic foot wounds.

Members of WHMC and UPMC were chosen for the project team based on their expertise in Platelet Gel technology. The project team conducted a detailed evaluation in order to develop an effective research study protocol. The project team reviewed many sources including literature on clinical trials designed to assess the impact of autologous, blood derived wound healing products; research on existing evidence-based guidelines, position statements and expert opinions pertaining to growth factors; and equipment. This study protocol was designed to demonstrate the safety and efficacy of Platelet Gel Therapy on non-healing diabetic lower extremity wounds. The study protocol, named "A Randomized Prospective Multi-Centered, Investigator-blinded Trial of Platelet Rich Plasma (PRP) Gel Versus Control for the Treatment of Diabetic Neurotrophic Leg Ulcers", was presented to the Office of the Air Force Surgeon General as part of the FY '05 Diabetes New Projects Proposal. This protocol was submitted to the Food and Drug Administration (FDA) in the third quarter of 2005. The Platelet Gel project team is conducting negotiations with the FDA in order to receive approval to conduct the research study. Once approval has been obtained, the project team will submit the research protocol for approval to the University of Pittsburgh Institutional Review Board (IRB), WHMC IRB, and the Office of the Surgeon General of the Air Force for second level approval.

Project Delays

The FDA approval process for the research protocol has provided several months delay. Initially the FDA was unable to approve the research study by the close of 2005. The FDA requires several modifications to the research protocol, which significantly affect the research study design. The Platelet Gel project team is currently conducting FDA "Type C" meetings with the FDA in order to negotiate which items will require additional modification in order to gain final approval. This process could delay the initiation of the IRB approval process by approximately six months. Once FDA approval has been obtained, the project team will submit the research protocol for approval to the University of Pittsburgh IRB, WHMC IRB, and the Office of the Surgeon General of the Air Force for second level approval.

Teleophthalmology

Develop and implement an image transfer system and enterprise image archive for retinal images

With a focus on the workflow process, the project team at UPMC and Wilford Hall Medical Center has been working to create a flexible, modular and mobile system and efficient workflow process. The core of the system is a laptop with adequate processing power and memory to act as a server with a SQL database, while the rest of the system is comprised of "stations" (such as registration, imaging, and consultation) that can be added, removed or modified as needed to customize the workflow. Each station's function is worklist driven, eliminating typing errors and improving productivity. A server-generated unique identifier tracks patient movement through the stations, possibly non-sequentially depending on the setting and system's configured layout. This allows for tracking of workflow processes and may contribute to changes in the future. The retinal imaging station has been configured using custom software. Imaging stations can be set up in a darkened area or tent with adequate space and ventilation for the patient, photographer, computer and non-mydriatic retinal camera. A consultation station can be set up for patients to discuss their images with a board certified ophthalmologist, who grades the images and recommendations for further treatment as indicated.

The user interface for importation of data files (JPG or DICOM) and unique identifiers for patients (meta-data) is complete. System software is in place for the transfer of images and meta-data to a designated server and the system's design will easily enable transfer of data packages to an enterprise digital image archive system or alternative servers in the future. Image reader screens for registration, imaging and grading are in place. Refinements are being made as per team/user recommendation and/or evaluation feedback. Image grading tools and data mining and reporting tools are near completion. The system was initially field tested at a community health expo and is currently being used in clinical settings at UPMC. A van has been equipped with an imaging station and is ready to travel to screening events in Pittsburgh communities. IRB approved studies are being conducted across settings and findings are contributing to refinements to the system and workflow processes.

In November key project personnel from UPMC and Wilford Hall Medical Center (WHMC) met in Pittsburgh to clarify AFMS teleophthalmology requirements and to assess the feasibility of using UPMC software for ophthalmology screenings. Based on the WHMC and AFMS requirements for software that is ICDB and CHCS 2 (AHLTA) compatible and has also met USAF information assurance (AI) requirements, the UPMC software will not be deployed at WHMC at this time. WHMC will continue to collaborate with UPMC in the development and refinement of the system and workflow processes. Both sites may combine patient outcome data to assess the impact and effectiveness of using non-mydriatic digital fundus photography as a screening modality for diabetic retinopathy.

Three teleophthalmology abstracts were accepted for the 2006 American Telemedicine Association (ATA) Conference, two as oral presentations and one as a poster presentation.

Evaluation

Assess the capabilities and effectiveness of the technology and workflow process being created to support a Teleophthalmology screening program for diabetic retinopathy.

Observations
Observations began at the first public use of this technology. Saturday, August 27th the teleophthalmology software, equipment and staff were used to consent, register, image and subsequently grade eye photos on 81 subjects. This was done at the David L. Lawrence Convention Center in conjunction with the *Healthy 4 Life and American Diabetes Association Expo.*

See appendices: Teleophthalmology Healthy 4 Life/American Diabetes Association Expo

Focus Groups/Interviews
Two focus groups were conducted within a week of the Expo. The first occurred on Wednesday, August 31st during IMITS bi-weekly clinical meeting with key project personnel in attendance. The second was on Friday, September 2nd with participation solicited from everyone involved in project development and the screening event. One on one interviews with the imager at additional clinic settings were also conducted.

Screening Activity Reports
Computer generated reports from the Expo were analyzed to calculate mean times for Consenting, Registering, Imaging and Grading. Data from clinical settings have also been collected.

IRB Approval Process
A request for an exempt study was submitted to the University of Pittsburgh IRB.
Also two separate modifications were later submitted. These were to add introductory scripts and to change evaluation PI. All were approved. This protocol was also submitted to the US Army HSRRB.

Publications/Presentations
Abstract, "Assessing the Capabilities and Effectiveness of a Teleophthalmology Screening Program" was accepted for presentation at ATA annual meeting 2006.

Education

LEADERSHIP TRAINING

Provide recommendations for development of a leadership training program in the Air Force

During the spring of 2005, four Wilford Hall Medical Center Air Force officers attended pilot leadership training courses at the UPMC/Beckwith Institute. The Level One – Emerging Leaders course was attended by one WHMC medical officer and three Senior WHMC medical officers attended the Level Three –Strategic Leaders training under the pilot project. The USAF Point

Papers/Travel Reports were collected and reviewed by WHMC and UPMC personnel to help with the evaluation of the courses.

In August 2005, at the request of the SGR this project was placed on hold. There were multiple factors influencing this decision including:

- Command changes at WHMC
- Level of funding support for USAF medical officer's travel to support the pilot project at UPMC
- High Ops-Tempo of deployment requirements at WHMC to support both ongoing efforts in Central Command and other emergency humanitarian support efforts such as the response to Hurricanes Katrina and Rita

A new proposal was submitted to the Office of the Air Force Surgeon General in October 2005 for consideration of the project under a new Division/Directive.

Diabetes Self Management Tool

Develop and deploy a Diabetes Self Management Tool in the office setting leveraging existing technology at UPMC (Italy)

The original intent of this project was to take what was being done in a separately funded congressional project on Diabetes and expand the associated technology to the Mediterranean. Due to unanticipated circumstances on the Diabetes project the start-up was substantially delayed. It was determined that all resources needed to be focused on the conus diabetes project. Expansion to the Mediterranean could take place at another time.

Major Barriers

Development of Teleradiology-Load Balancing Distributed Radiology Statement of Work

The development and eventual agreement of the Teleradiology Statement of Work resulted after many months of discussion. The most significant issue included the architecture definition.

Many conference calls and face-to-face meetings were conducted between the US Air Force and UPMC. It was a time consuming process to reach a final agreement on the architecture. While the statement of work was being refined, the team continued to provide support to the teleradiology efforts (Stentor 3.2.2) at Wright-Patterson Air Force Base. The Statement of Work was revised and finally agreed upon in September 2005. The new Statement of Work was submitted to the Air Force Surgeon General's Office as the FY05 Teleradiology proposal in October 2005.

Hurricane Katrina and impact on Keesler Air Force Base

In September 2005, Hurricane Katrina had a devastating impact on the Keesler Air Force Base. Much of Keesler AFB experienced significant salt-water damage and the hospital was not able to function for several months.

From September through December 2005, the Telepathology "Case of the Week" was put on hold. Fortunately, the telepathology equipment at Keesler Air Force Base was not damaged by the Hurricane. It was relocated to space in the "previous" Keesler emergency room. The Air Force pathology team did a tremendous job in getting the pathology equipment functioning again. They also led the effort to get the Telepathology "Case of the Week" started again. During January 2006, the first case was hosted by Keesler Air Force Base.

Key Research Accomplishments

Teleradiology

- Implemented Stentor 3.2.2 for Wright-Patterson (WP) AFB Medical Center.
- Selected and in-process of installing the DICOM Modality Worklist at WP AFB Medical Center.
- Implemented the Emergency Department Clinical View wrapper for WP AFB Medical Center.
- Purchased two years of Stentor Maintenance.
- Established a training program for WP System Administrators.

Teleaudiology

- Determined the Audiologist and Otolaryngology surgeon subject matter experts from WHMC and UPMC and enrolled them as members of the project team.
- Contacted the three US manufactures – Cochlear Americas, Advanced Bionics, and Med-EL and obtained their participation in the project.
- Acquired letters of intent to participate from the manufactures.
- Evaluated the current requirements and procedures for cochlear implant mapping.
- Outlined a proposed solution using video conferencing equipment and a form of remoter control software.

Telepathology

- IRB approved Quality Assurance (QA) validation study completed.
- QA manuscript accepted for publication.
- IRB approved Primary Diagnosis validation study completed.
- Primary Diagnosis manuscript accepted for publication.
- IRB approved Primary Diagnosis: Immunohistochemical (IHC) validation study near completion.

- Protocol developed for assessment of capabilities and limitations of "best in class" high-speed, high-volume WSI systems.
- Improved network performance through Webserver load performance testing and modifications at UPMC
- Conducted "Case of Week" sessions with participation from Keesler, Travis, and Eglin AFBs, and UPMC.

Extra-Corporeal Membrane Oxygenation (ECMO)

- Two planning sessions were held.
- The final proposal for new congressional funding was submitted in October 2005.

Simulation and Training

Advanced Medical Education

- Developed a collaborative model to assist in the development of the University of Hawaii (UH) Center.
- Developed MOAs and licensing agreements to share curriculum and technologies (Pending approval).
- Identified existing Asia partnerships with UH to leverage other WISER or UH collaborations.
- Identified and in the process of ordering hardware and software for the new UH Center that is compatible to that of UPMC.
- Completed UH proto-type design of the SIMS application.
- Conducted one educational outreach program for Asia.

Simulation at Wilford Hall Medical Center

- WHMC Commander vision obtained for needs assessment goal
- Site visits and assessments of San Antonio and National Sim Centers (WISER, USUHS, National Capital Center, and CSTARS, Baltimore)
- WHMC Simulation Working group established-including SAUSHEC, USAFSAM, Readiness Annual training, RSV managers, UPMC
- Interested "users" and their needs identified: GME (pediatrics), Readiness (RSV skills and team training, Annual training)
- Pilot center space obtained in WHMC ICU and equipped with existing WHMC mannequins, loaners, and excess property
- Trained over 500 students

"Patient Transfer" Simulation Training

- Provided scope and evaluation timeline for Patient Transfer course.
- Gathered relevant information on specific programs and general support structure.
- Developed course goals, objectives, curriculum, and education tools.
- Developed evaluation and feedback methods.
- Developed research study protocol.

- Received University of Pittsburgh IRB approval for the study protocol.
- Began first round of nursing training on the new curriculum.

Platelet Gel Therapy

- Enrolled Platelet Gel experts from WHMC and UPMC as members of the project team.
- Completed literature review of clinical trial studies designed to assess impact of autologous, blood derived wound healing products in order to develop a research study protocol.
- Completed research on existing evidence-based guidelines, position statements and expert opinions pertaining to growth factors in order to develop a research study protocol.
- Defined the parameters of the clinical trial within a research study protocol. Presented the protocol to the Office of the Air Force Surgeon General including study design, evaluation methodology, and inclusion / exclusion criteria.
- Submitted an Investigational Device Exemption (IDE) application to Food and Drug Administration (FDA) for the research study protocol – pending FDA approval.

Teleophthalmology

- Received Pitt IRB exempt approval for Teleophthalmology Study in August 2005.
- Developed user interface for importation of data files (JPG or DICOM) and unique identifiers for patients (meta-data).
- Developed process and software to transfer images from cameras to server / network.
- Developed image reader screens.
- Launched software/process in community setting during August 2005 at 2005 Healthy 4 Life Expo. David L. Lawrence Convention Center, Pittsburgh, PA.
- Launched software/process in clinical setting in November 2005. UPMC General Internal Medicine Clinic, Pittsburgh, PA.
- Notified of acceptance of three project abstracts for the 2006 American Telemedicine Association (ATA) Conference: two as oral presentations and one as a poster presentation.

Education - Leadership Training

- One medical officer from WHMC attended the Level One – Emerging Leaders training under the pilot project at UPMC.
- Three medical officers from WHMC attended the Level Three – Strategic Leaders training under the pilot project at UPMC.
- Collected and reviewed USAF Point Papers / Travel Reports with regard to the evaluation of the participants in the pilot project at UPMC.
- New proposal has been submitted to the Office of the Air Force Surgeon General.

Reportable Outcomes

Please see Appendices for work product documentation.

Conclusions

The Air Force has benefited from the joint development and implementation of the multi-disciplinary IMITS Program initiatives. The IMITS program has gained momentum since it was able to build upon the previous years of effort. Next year's work will continue to build upon the accomplishments of this past year. Here is a summary of the IMITS highlights:

- Wright-Patterson AFB Medical Center upgraded their PACS to Stentor iSite 3.2.2, a state of the art PACS. The implementation included development of custom software, training system administrators, and providing maintenance through Stentor.
- A pilot simulation center was established at Wilford Hall Medical Center. This simulation center has provided training to over 500 Air Force personnel. Among departments that have used the simulation center for training include Pediatrics Emergency Room, Surgical Intensive Care, Pulmonary fellows and Respiratory Technicians, and Trauma training and readiness skills training for predeployment preparation.
- Three US manufacturers have been working with the Teleaudiology team to propose possible solutions for remote cochlear implant mapping. These solutions are being evaluated.
- Two telepathology validation studies were completed and the manuscripts have been accepted and submitted for publication. Leading edge Telepathology training is being provided during the "Case of the Week" sessions with Keesler AFB, Travis AFB, Eglin AFB, & UPMC.
- The Teleopthalmology team is developing an image transfer system including workflow processes that can be used in community and clinical settings.
- The Platelet Gel Therapy team submitted an Investigational Device Exemption (IDE) application to the Food and Drug Administration (FDA) for the research study protocol. The team is currently working through the FDA identified issues.

Evaluation of these projects is ongoing. Preliminary response from the Air Force and UPMC has been positive. The benefits defined by the participants include improved productivity and quality.

References

None

Appendices

A. TELEPATHOLOGY PUBLICATIONS & PRESENTATIONS

Publications

- Yagi, Y., and Gilbertson, J.R., (2005) *Digital Imaging in pathology: the case for standardization.* Journal of Telemedicine and Telecare 11(3): 109-16.
- Ho, J., Parwani, A.V., Jukic, D.M., Yagi, Y. Anthony, L., and Gilbertson, J.R. (in press) *Use of whole slide imaging in surgical pathology quality assurance: design and pilot validation studies.* Human Pathology.
- Gilbertson, J.R., Ho, J., Anthony, L., Jukic, D.M., Yagi, Y., and Parwani, A.V. (submitted). *Primary histologic diagnosis using automated whole slide imaging: a validation study.* BioMedical Central.

Presentations

- Gilbertson, J. (3/2005) *Whole slide imaging: An update at the 2005 lab information technology summit.* Lab InfoTech Summit 2005, Las Vegas, NV.
- Zalme, R.C., Anthony, L., Gilbertson, J., Gadd, C., and Krills, S. (4/2005) *Integration of a sophisticated telepathology system into the clinical workflow of the Air Force.* 2005 American Telemedicine Association Conference. Denver, CO.
- Gilbertson, J.G. (4/2005) *Telepathology update.* 2005 American Telemedicine Association Conference. Denver, CO.
- Jukic, D.M. ((8/2005) *Virtual slide imaging clinical applications: The time is now.* 2005 Advancing Practice, Instruction and Innovation through Informatics Conference, Lake Tahoe, CA.
- Ho, J. (8/2005) *Clinical implementation of WSI.* 2005 Advancing Practice, Instruction and Innovation through Informatics Conference, Lake Tahoe, CA.

B. TELERADIOLOGY:STENTOR Survey Findings Time Points 1-6

TIME POINT 1	Radiologist (4)	Clinician (3)	Technologist (23)	Other (2)	Total (32)	Percent
Q1 - Image quality will be comparable to or better than the current PACS system?						
Strongly Agree	1	0	7	2	10	31
Agree	1	3	14	0	18	56
Not Sure	2	0	2	0	4	13
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q2 – There will be wide-scale availability to the Stentor system in the Medical Center?						
Strongly Agree	1	1	9	1	12	38
Agree	2	1	11	0	14	44
Not Sure	1	1	3	1	6	18
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q3 - You will be able to access the Stentor system outside of the Medical Center?						
Strongly Agree	2	0	7	1	10	31
Agree	1	2	6	0	9	28
Not Sure	1	1	7	1	10	31
Disagree	0	0	1	0	1	3
Strongly Disagree	0	0	2	0	2	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q4 – You will be able to query the system to locate patient information and bring up images?						
Strongly Agree	1	1	10	2	14	44
Agree	2	2	13	0	17	53
Not Sure	1	0	0	0	1	3
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q5 – The system will display current Stentor images in less than 5 seconds?						
Strongly Agree	1	1	8	2	12	38
Agree	0	2	8	0	10	32
Not Sure	3	0	7	0	10	32
Disagree	0	0	0	0	0	0

TIME POINT 1	Radiologist (4)	Clinician (3)	Technologist (23)	Other (2)	Total (32)	Percent
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q6 – The system will display prior/archived Stentor images in less than 20 seconds?						
Strongly Agree	0	2	8	2	12	38
Agree	0	1	8	0	9	28
Not Sure	4	0	6	0	10	31
Disagree	0	0	1	0	1	3
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q7 - Stentor will generally make it easier for you to accomplish your work?						
Strongly Agree	0	1	7	2	10	32
Agree	3	2	14	0	19	59
Not Sure	1	0	2	0	3	9
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q8 - Stentor will increase your productivity?						
Strongly Agree	0	1	8	2	11	34
Agree	3	0	11	0	14	44
Not Sure	1	2	4	0	7	22
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q9 - Stentor will make results available to clinicians faster than with the current PACS?						
Strongly Agree	0	1	9	0	10	31
Agree	1	1	9	2	13	41
Not Sure	3	1	5	0	9	28
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q10 - Stentor will improve provider to provider communications?						
Strongly Agree	0	1	7	1	9	28
Agree	1	1	9	1	12	38
Not Sure	3	1	7	0	11	34
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0

TIME POINT 1	Radiologist (4)	Clinician (3)	Technologist (23)	Other (2)	Total (32)	Percent
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q11 - Stentor would improve provider to patient communications?						
Strongly Agree	0	1	7	1	9	28
Agree	1	1	9	1	12	38
Not Sure	3	1	7	0	11	34
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q12 - Stentor will improve patient care?						
Strongly Agree	0	1	9	1	11	34
Agree	2	1	11	1	15	47
Not Sure	2	1	3	0	6	19
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100

TIME POINT 2	Radiologist (4)	Clinician (1)	Technologist (21)	Other (2)	Total (28)	Percent
Q1 - Image quality will be comparable to or better than the current PACS system?						
Strongly Agree	4	0	7	2	13	46
Agree	0	0	11	0	11	40
Not Sure	0	1	3	0	4	14
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q2 – There will be wide-scale availability to the Stentor system in the Medical Center?						
Strongly Agree	2	0	6	2	10	36
Agree	2	0	10	0	12	43
Not Sure	0	1	5	0	6	21
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q3 - You will be able to access the Stentor system outside of the Medical Center?						
Strongly Agree	3	0	5	0	8	29
Agree	0	1	4	0	5	17
Not Sure	0	0	9	2	11	40
Disagree	1	0	3	0	4	14
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q4 – You will be able to query the system to locate patient information and bring up images?						
Strongly Agree	4	0	11	2	17	60
Agree	0	0	8	0	8	29
Not Sure	0	1	2	0	3	11
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q5 – The system will display current Stentor images in less than 5 seconds?						
Strongly Agree	3	0	9	2	14	50
Agree	1	0	10	0	11	40
Not Sure	0	1	1	0	2	10
Disagree	0	0	1	0	1	0

TIME POINT 2	Radiologist (4)	Clinician (1)	Technologist (21)	Other (2)	Total (28)	Percent
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q6 – The system will display prior/archived Stentor images in less than 20 seconds?						
Strongly Agree	2	0	11	2	15	54
Agree	1	0	8	0	9	32
Not Sure	1	1	2	0	4	14
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q7 - Stentor will generally make it easier for you to accomplish your work?						
Strongly Agree	2	0	10	2	14	50
Agree	0	0	5	0	5	18
Not Sure	2	1	6	0	9	32
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q8 - Stentor will increase your productivity?						
Strongly Agree	1	0	10	2	13	46
Agree	2	0	4	0	6	21
Not Sure	1	1	7	0	9	32
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q9 - Stentor will make results available to clinicians faster than with the current PACS?						
Strongly Agree	2	0	9	1	12	43
Agree	1	0	6	0	7	25
Not Sure	0	1	6	0	7	25
Disagree	1	0	0	0	1	3
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	1	1	3
	4	1	21	2	28	100
Q10 - Stentor will improve provider to provider communications?						
Strongly Agree	2	0	5	0	7	25
Agree	0	0	12	2	14	50
Not Sure	1	1	4	0	6	21
Disagree	1	0	0	0	1	3
Strongly Disagree	0	0	0	0	0	0

TIME POINT 2	Radiologist (4)	Clinician (1)	Technologist (21)	Other (2)	Total (28)	Percent
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q11 - Stentor would improve provider to patient communications?						
Strongly Agree	1	0	5	0	6	21
Agree	0	0	9	0	9	33
Not Sure	2	1	7	2	12	43
Disagree	1	0	0	0	1	3
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100
Q12 - Stentor will improve patient care?						
Strongly Agree	1	0	8	2	11	40
Agree	2	0	9	0	11	40
Not Sure	1	1	4	0	6	20
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	1	21	2	28	100

TIME POINT 3	Radiologist (4)	Clinician (3)	Technologist (6)	Other (2)	Total (15)	Percent
Q1 - You are able to query the Stentor system to locate patient info and bring up images?						
Strongly Agree	0	0	1	1	2	13
Agree	3	1	5	1	10	67
Not Sure	0	2	0	0	2	13
Disagree	0	0	0	0	0	0
Strongly Disagree	1	0	0	0	1	7
No answer	0	0	0	0	0	0
	4	3	6	2	15	100
Q2 – Current patient images can be selected and displayed promptly?						
Strongly Agree	3	0	3	0	6	40
Agree	1	1	2	2	6	40
Not Sure	0	2	0	0	2	13
Disagree	0	0	1	0	1	7
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	6	2	15	100
Q3 - Prior/archived images can be retrieved and displayed in a timely manner?						
Strongly Agree	0	0	2	0	2	13

TIME POINT 3	Radiologist (4)	Clinician (3)	Technologist (6)	Other (2)	Total (15)	Percent
Agree	0	1	2	0	3	20
Not Sure	1	1	0	0	2	13
Disagree	0	1	2	0	3	20
Strongly Disagree	3	0	0	2	5	34
No answer	0	0	0	0	0	0
	4	3	6	2	15	100
Q4 – Image quality is comparable to or better than the old PACS system?						
Strongly Agree	0	0	2	2	4	27
Agree	3	2	4	0	9	60
Not Sure	1	1	0	0	2	13
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	6	2	15	100
Q5 – Image management is intuitive or easy to figure out?						
Strongly Agree	0	0	5	1	6	40
Agree	0	0	0	1	1	7
Not Sure	3	3	0	0	6	40
Disagree	0	0	0	0	0	0
Strongly Disagree	1	0	1	0	2	13
No answer	0	0	0	0	0	0
	4	3	6	2	15	100
Q6 – Patient information is easy to retrieve, edit and complete?						
Strongly Agree	0	0	1	1	2	13
Agree	1	0	2	1	4	27
Not Sure	1	2	3	0	6	40
Disagree	1	0	0	0	1	7
Strongly Disagree	1	0	0	0	1	7
No answer	0	1	0	0	1	7
	4	3	6	2	15	100

TIME POINT 4	Radiologist (4)	Clinician (2)	Technologist (3)	Other (0)	Total (9)	Percent
Q1 - You are able to query the Stentor system to locate patient info and bring up images?						
Strongly Agree	4	1	1	0	6	67
Agree	0	1	2	0	3	33
Not Sure	0	0	0	0	0	0
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0

TIME POINT 4	Radiologist (4)	Clinician (2)	Technologist (3)	Other (0)	Total (9)	Percent
No answer	0	0	0	0	0	0
	4	2	3	0	9	100
Q2 – Current patient images can be selected and displayed promptly?						
Strongly Agree	4	1	1	0	6	67
Agree	0	1	2	0	3	33
Not Sure	0	0	0	0	0	0
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	2	3	0	9	100
Q3 - Prior/archived images can be retrieved and displayed in a timely manner?						
Strongly Agree	1	1	1	0	3	34
Agree	2	0	2	0	4	45
Not Sure	0	0	0	0	0	0
Disagree	1	0	0	0	1	11
Strongly Disagree	0	1	0	0	1	11
No answer	0	0	0	0	0	0
	4	2	3	0	9	100
Q4 – Image quality is comparable to or better than the old PACS system?						
Strongly Agree	3	1	1	0	5	56
Agree	0	1	1	0	2	22
Not Sure	1	0	1	0	2	22
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	2	3	0	9	100
Q5 – Image management is intuitive or easy to figure out?						
Strongly Agree	3	1	0	0	4	45
Agree	1	1	2	0	4	45
Not Sure	0	0	1	0	1	11
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	2	3	0	9	100
Q6 – Patient information is easy to retrieve, edit and complete?						
Strongly Agree	3	1	1	0	5	56
Agree	0	0	2	0	2	22
Not Sure	1	1	0	0	2	22
Disagree	0	0	0	0	0	0

TIME POINT 4	Radiologist (4)	Clinician (2)	Technologist (3)	Other (0)	Total (9)	Percent
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	2	3	0	9	100
Q7 – You have had sufficient training on the use of Stentor?						
Strongly Agree	1	1	0	0	2	22
Agree	3	0	3	0	6	67
Not Sure	0	0	0	0	0	0
Disagree	0	1	0	0	1	11
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	2	3	0	9	100
Q8 – System support is readily available and helpful?						
Strongly Agree	2	1	1	0	4	45
Agree	1	1	2	0	4	45
Not Sure	0	0	0	0	0	0
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	0	0	1	11
	4	2	3	0	9	100

TIME POINT 5	Radiologist (3)	Clinician (3)	Technologist (16)	Other (2)	Total (24)	Percent
Q1 - You are able to query the Stentor system to locate patient info and bring up images?						
Strongly Agree	1	3	5	2	11	46
Agree	2	0	11	0	13	54
Not Sure	0	0	0	0	0	0
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	3	3	14	2	24	100
Q2 – Current patient images can be selected and displayed promptly?						
Strongly Agree	2	3	3	1	9	38
Agree	1	0	12	1	14	58
Not Sure	0	0	0	0	0	0
Disagree	0	0	1	0	1	4
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	3	3	16	2	24	100
Q3 - Prior/archived images can be retrieved and displayed in a timely manner?						
Strongly Agree	0	1	2	0	3	13
Agree	1	0	9	1	11	46
Not Sure	1	2	3	0	6	25
Disagree	1	0	0	1	2	8
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	2	0	2	8
	3	3	16	2	24	100
Q4 – Image quality is comparable to or better than the old PACS system?						
Strongly Agree	1	2	8	2	13	54
Agree	1	1	4	0	6	25
Not Sure	0	0	4	0	4	17
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	0	0	1	4
	3	3	16	2	24	100
Q5 – Image management is intuitive or easy to figure out?						
Strongly Agree	2	2	4	0	8	34
Agree	1	1	9	2	13	54
Not Sure	0	0	2	0	2	8
Disagree	0	0	1	0	1	4
Strongly Disagree	0	0	0	0	0	0

TIME POINT 5	Radiologist (3)	Clinician (3)	Technologist (16)	Other (2)	Total (24)	Percent
No answer	0	0	0	0	0	0
	3	3	16	2	24	100
Q6 – Patient information is easy to retrieve, edit and complete?						
Strongly Agree	1	1	3	0	5	21
Agree	0	0	9	2	11	46
Not Sure	0	1	4	0	5	21
Disagree	0	1	0	0	1	4
Strongly Disagree	1	0	0	0	1	4
No answer	1	0	0	0	1	4
	3	3	16	2	24	100
Q7 – You have had sufficient training on the use of Stentor?						
Strongly Agree	1	2	2	0	5	21
Agree	1	1	9	1	12	0
Not Sure	0	0	5	1	6	25
Disagree	0	0	0	0	0	0
Strongly Disagree	1	0	0	0	1	4
No answer	0	0	0	0	0	0
	3	3	16	2	24	100
Q8 – System support is readily available and helpful?						
Strongly Agree	1	3	2	0	6	25
Agree	2	0	9	2	13	54
Not Sure	0	0	4	0	4	17
Disagree	0	0	1	0	1	4
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	3	3	16	2	24	100

TIME POINT 6	Radiologist (5)	Clinician (10)	Technologist (18)	Other (1)	Total (34)	Percent
Q1 – You had sufficient training on the use of Stentor?						
Strongly Agree	3	0	3	1	7	21
Agree	1	7	9	0	17	50
Not Sure	0	1	4	0	5	15
Disagree	0	1	1	0	2	6
Strongly Disagree	0	1	0	0	1	3
No answer	1	0	1	0	2	6
	5	10	18	1	34	100
Q2 – There is wide-scale availability to Stentor in the Medical Center?						
Strongly Agree	2	2	3	1	8	24
Agree	2	6	11	0	19	56
Not Sure	0	1	3	0	4	12
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	1	1	1	0	3	9
	5	10	18	1	34	100
Q3 – You are able to query Stentor to locate patient information and bring up images?						
Strongly Agree	3	4	8	0	15	44
Agree	0	6	10	1	17	50
Not Sure	0	0	0	0	0	0
Disagree	0	0	0	0	0	0
Strongly Disagree	1	0	0	0	1	3
No answer	1	0	0	0	1	3
	5	10	18	1	34	100
Q4 – System support is readily available?						
Strongly Agree	2	0	3	1	6	18
Agree	2	6	13	0	21	62
Not Sure	0	4	1	0	5	15
Disagree	0	0	1	0	1	3
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	0	0	1	3
	5	10	18	1	34	100
Q5 – The system displays current images in less than 5 seconds?						
Strongly Agree	3	0	7	1	11	32
Agree	1	8	7	0	16	47
Not Sure	0	0	2	0	2	6
Disagree	0	2	2	0	4	12
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	0	0	1	3
	5	10	18	1	34	100
Q6 – The system displays prior/archived images in less than 20 seconds?						
Strongly Agree	2	1	5	0	8	24

TIME POINT 6	Radiologist (5)	Clinician (10)	Technologist (18)	Other (1)	Total (34)	Percent
Agree	0	8	10	0	18	52
Not Sure	0	0	3	1	4	12
Disagree	1	1	0	0	2	6
Strongly Disagree	1	0	0	0	1	3
No answer	1	0	0	0	1	3
	5	10	18	1	34	100
Q7 – Image quality is comparable to or better than traditional PACS systems?						
Strongly Agree	2	1	6	1	10	29
Agree	1	5	9	0	15	44
Not Sure	1	3	2	0	6	18
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	1	1	1	0	3	9
	5	10	18	1	34	100
Q8 – Patient information is easy to retrieve, edit and complete?						
Strongly Agree	2	1	5	0	8	24
Agree	2	4	7	1	14	41
Not Sure	0	3	6	0	9	26
Disagree	0	2	0	0	2	6
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	0	0	1	3
	5	10	18	1	34	100
Q9 – Image management is intuitive or easy to figure out?						
Strongly Agree	2	0	2	0	4	12
Agree	2	5	12	1	20	59
Not Sure	0	3	3	0	6	18
Disagree	0	2	0	0	2	6
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	1	0	2	6
	5	10	18	1	34	100
Q10 – Stentor has generally made it easier for you to accomplish your work?						
Strongly Agree	2	2	6	1	11	32
Agree	2	8	8	0	18	53
Not Sure	0	0	3	0	3	9
Disagree	0	0	1	0	1	3
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	0	0	1	3
	5	10	18	1	34	100
Q11 – Stentor has increased your productivity?						
Strongly Agree	2	3	5	1	11	32
Agree	1	3	2	0	6	18
Not Sure	1	4	9	0	14	41

TIME POINT 6	Radiologist (5)	Clinician (10)	Technologist (18)	Other (1)	Total (34)	Percent
Disagree	0	0	2	0	2	6
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	0	0	1	3
	5	10	18	1	34	100
Q12 – Stentor has helped make results available to clinicians faster than with traditional PACS?						
Strongly Agree	1	1	3	1	6	18
Agree	1	5	7	0	13	38
Not Sure	2	2	6	0	10	29
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	1	2	2	0	5	15
	5	10	18	1	34	100
Q13 – Your are able to access Stentor from outside the Medical Center?						
Strongly Agree	2	0	0	0	2	6
Agree	2	1	2	0	5	15
Not Sure	0	4	12	1	17	50
Disagree	0	1	1	0	2	6
Strongly Disagree	0	4	2	0	6	18
No answer	1	0	1	0	2	6
	5	10	18	1	34	100
Q14 – Stentor has improved provider-provider communications?						
Strongly Agree	1	0	2	0	3	9
Agree	1	3	3	1	8	24
Not Sure	2	4	11	0	17	50
Disagree	0	3	0	0	3	9
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	2	0	3	9
	5	10	18	1	34	100
Q15 – Stentor has improved provider-patient communications?						
Strongly Agree	1	0	3	1	5	15
Agree	1	4	6	0	11	32
Not Sure	2	2	8	0	12	35
Disagree	0	4	1	0	5	15
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	0	0	1	3
	5	10	18	1	34	100
Q16 –Stentor has improved patient care?						
Strongly Agree	1	1	6	1	9	26
Agree	2	6	5	0	13	38
Not Sure	1	3	6	0	10	29

TIME POINT 6	Radiologist (5)	Clinician (10)	Technologist (18)	Other (1)	Total (34)	Percent
Disagree	0	0	1	0	1	3
Strongly Disagree	0	0	0	0	0	0
No answer	1	0	0	0	1	3
	5	10	10	1	34	100

C. Teleophthalmology Healthy 4 Life/American Diabetes Association Expo

Summary

- Eighty-one subjects were successfully consented and registered. All but one was imaged and graded.
- Mean time for subjects to be consented, registered, imaged and have eye photos graded was 00:37:26.
- Mean time for subjects to be registered, imaged and have eye photos graded was 00:28:06.
- Ninety-three percent of our sample had no retinopathy or levels of Non-Proliferative Diabetic Retinopathy. Only two (2.5 %) had Proliferative Diabetic Retinopathy that required immediate follow-up.

Demographics

On Saturday, August 27th the Teleophthalmology software, equipment and staff were used to consent, register, image and subsequently grade eye photos on 81 subjects. This was done at the David L. Lawrence Convention Center in conjunction with the *Healthy 4 Life and American Diabetes Association Expo.* Subjects were required to have diabetes. Nine percent were Type 1 and ninety-one percent were Type 2. Fifty-eight percent were female. Ages ranged from 28 to 85 and the mean age was 60 years old.

Pre-show Preparation/Setup

One week prior to show setup, equipment was assembled and staff met for a "dry run". Goals for that meeting included:

- test software on PC tablets
- train screening team
- review consent process and
- discuss logistics of moving equipment.

The software technology allowed the subjects' data to be entered and linked to images from the camera. Two tablets and a laptop were linked to the cameras. Those training to do registration requested that the tablets be used as laptops. They also requested an addition of a mouse. When timed it was taking approximately 20 minutes vs. 10 minutes to enter data on the tablet as opposed to a laptop. Having the camera set up also allowed for adjustments and further training of the imager. Due to convention center constraints, setup could not begin until Friday afternoon. It was decided that as much of the equipment as possible would be moved on Thursday, August 25th.

Setup at the convention center commenced at 3:30 PM and ended at 6:30 PM on Friday, August 26th. Equipment included two cameras, two camera tables with chairs, two PC carts, and two computers with monitors and keyboards. During set-up, a cable was found to be missing and brought in the next morning. The tent to house the cameras was small with nothing to divide the sides. A makeshift curtain was installed. Also, the area to consent and register did not have

enough space for needed tables and chairs. A check of supplies revealed no consent forms. A call was made in time to have copies ready for the next morning. Privacy issues also were noted as concerns.

Timing

On Saturday, August 27th, observations began at 8:52 and ended at 15:39. Eighty-one subjects were seen during that time period. Timing was divided into four sections or stations: Consenting, Registering, Imaging and Grading.

Consenting:
Consenting had two components, the first was the time from when the subject was greeted and given the consent form to read and the second was from when the subject was assigned to a tech who would explain the study and if the subject agreed the tech would obtain the necessary signatures. The times for consenting were recorded on post-it notes attached to the consent forms. These were later removed assuring anonymity of the subjects. Timing for the remaining categories was done electronically. See Table 1.

Table 1: Mean Time by Stations

	Begin	End	N	Mean
Consenting Part 1	8:52	15:03	61	00:02:00
Consenting Part 2	8:52	15:08	55	00:07:00
Consenting Total	8:52	15:08	50	00:09:00
Registering	9:04	15:16	61	00:08:56
Imaging	9:19	15:17	76	00:05:15
Grading	10:20	15:39	67	00:02:31
Total*	9:53	15:39	41	00:37:26
Total Without Consenting*	9:54	15:39	63	00:28:06

* Four outliers with times greater than one hour were removed. Because of the nature of the event, after having images taken, subjects were able to leave to visit other areas of the exhibition. We have assumed that subjects with total times in excess of one hour did not stay to complete the screening process and should be removed.

Registering, Imaging and Grading
The day was divided into hour ranges. Computer-assigned times marking the beginning of registering, imaging and grading were used to create six categories. At the end of the day, the two subjects registered at 15:01 and 15:05 were added to the previous hour. See Table 2. Mean registering and mean total time stayed fairly constant. Mean imaging and mean grading time improved in that it took less time per subject. When removing consenting time the mean total time also improved.

Table 2: Mean Times by Stations and Hours

	Mean Registering	Mean Imaging	Mean Grading	Mean Total*	Mean Total Without Consenting*
9:00 -10:00	00:10:29	00:06:01	00:03:05	no sample	00:37:26
10:00 – 11:00	00:07:42	00:06:20	00:02:07	00:42:01	00:31:56
11:00 – 12:00	00:07:38	00:05:09	00:02:45	00:34:01	00:25:11
12:00 – 13:00	00:08:05	00:03:50	00:01:47	00:34:27	00:25:09
13:00 – 14:00	00:10:15	00:06:40	00:02:29	00:44:19	00:31:40
14:00 – 16:00	00:10:06	00:03:23	00:03:06	00:36:05	00:25:41

* Four outliers with times greater than one hour were removed. Because of the nature of the event, after having images taken, subjects were able to leave to visit other areas of the exhibition. We have assumed that subjects with total times in excess of one hour did not stay to complete the screening process and should be removed.

Subjects' ages were divided into three categories. The younger subjects, 20 to 30 year olds took slightly longer to register but were quicker to be imaged. See Table 3.

Table 3: Mean Times by Stations and Subject Ages

	Mean Registering	Mean Imaging	Mean Grading	Mean Total*	Mean Total Without Consenting*
20 – 30 years old	00:10:16	00:03:17	00:02:38	00:39:09	00:26:03
40 – 60 years old	00:08:27	00:05:05	00:02:36	00:36:22	00:28:06
70 – 80 years old	00:09:40	00:06:19	00:02:08	00:39:53	00:29:03

* Four outliers with times greater than one hour were removed. Because of the nature of the event, after having images taken, subjects were able to leave to visit other areas of the exhibition. We have assumed that subjects with total times in excess of one hour did not stay to complete the screening process and should be removed.

Observations

Layout

Teleophthalmology was given a very prominent location on the outside end of the UPMC exhibit area. This was a high traffic area with throughways to the main convention center and also to those entering the UPMC area. Signs were moved to better identify the area and the greeting table. Layout of the area was not problem free. The tables provided were tall and required stools.

The entrance area was crowded and did not have consenting and registering areas marked. Entrance to and from the tented camera area was sufficient unless the subject was in a wheelchair or mobile device. Once the subject had images taken, they were usually directed to the waiting area. The waiting area was removed from the congested, high-traffic area. The grader could have been reading in a more secluded protected spot. The grading station was isolated, but not totally private and offered the subject time to view images with the grader. Subjects seemed very pleased to be able to sit with grader (specialist) and view their photos.

Technical
Equipment was up and running before projected start time. There seemed to be few technical issues. Several times the server grabbed the image before letting it go to the grader and it had to be manually sent again. Grader could not obtain three or four of the images. These again were manually copied. No appreciative amount of time was lost. There was also a time early on when the server had to be physically moved but no data was lost. The convention center lighting glared the laptop screen.

Staffing
The staff for the event appeared to work very well together. Those consenting and registering had to constantly determine who was free to take the next subject. A few times, there was confusion over which subject was next but the staff was able to work that out without subjects complaining. In the beginning there were some subjects that got "lost" but this was because they were directed to the wrong area. Many times the imager would personally escort the subject to the waiting area. This was often necessary if the subject had some disability. The number of staff was adequate, except when staff break/leave times overlapped.

Subjects
All 81 subjects were consented and registered. Only one subject could not be imaged due to small pupil size. A comment described one patient as less than cooperative and difficult. Forty-seven percent had a dilated eye exam within the last twelve months and 70% responded that a M.D. or O.D examined them. Follow-up results were given to the subjects by the grader. See Table 4. Ninety-three percent of our sample had no retinopathy or levels of Non-Proliferative Diabetic Retinopathy (NPDR). Only 2 (2.5%) had Proliferative Diabetic Retinopathy.

Table 4: Subject Follow-up Status

Follow-up	Detail	N	%
Within one year	No retinopathy or mild Non-Proliferative Diabetic Retinopathy (NPDR) and no macular edema	63	77.8
Within 6 months	Moderate NPDR and no macular edema	6	7.4
Within 3 months	Severe NPDR and no macular edema	6	7.4
ASAP	Proliferative Diabetic Retinopathy (PDR) and/or macular edema	2	2.5
No determination	No determination	3	3.7
No form	No form	1	1.2

Focus Groups

Two focus groups were conducted within a week of the Expo. The first occurred on Wednesday, August 31st during IMITS bi-weekly clinical meeting with key project personnel in attendance. The second was on Friday, September 2nd with participation solicited from everyone involved in project development and the screening event. See Table 5.

Table 5: Summary of Focus Group Findings

Theme/Category	Focus Group One Statement	Focus Group Two Statement
Setup/Teardown	Labeling "Labeling I think would be a good thing of course to get specific boxes and this is going to be more towards the mobile van and for the most part when we get those carts everything is going to be set up anyway I mean other than connecting the cables into the wall and then connecting from one computer to the server…"	
Layout	Communication "A lot of that was the architect was not listening to us because we made some concerns known ahead of time and he decided to do his own thing. For instance we had cocktail side tables with bar stools and we had at least four people come through in wheelchairs where we told him we needed low tables we were not able to accommodate people in wheelchairs."	Waiting Line The only thing I thought was difficult was we didn't really have a designated area to wait for consent. All of a sudden we had eight people in line…I was trying to think well just stay in this line over here but realized there wasn't a line per se.
Layout	Disabilities "The other thing too is with the people who are partially disabled we had a lot of people with canes and with mobility issues and if they got them selves up on a chair we had to help them down. Many times the tables and chairs almost went with them."	Signage "I think I might have them at a table something that said consent area. Something that identified that you could say you can go over to our consent area."

Table 5: Summary of Focus Group Findings

Theme/Category	Focus Group One Statement	Focus Group Two Statement
Layout Privacy	"Dr. Eller was right in the open with people walking by him." "Right there was no privacy even though concerns were made well in advance at least a month to address these issues they were not."	"I could even hear the one table some of the questions and that is way too close and that really does need to be a little more private."
Layout		Planning/Set-up "…if we could have small tables and the participants sits down the consenter comes over to the subject, consents them, the consenter gets up and motions for a register to come over to register them so the subject never moves they stay there through the whole process and then they can even stay there until they are ready to image them. If you had more than enough tables so if we had six people three consenters and three registers and you had eight tables then the person could sit at the table until the photographer is ready to take them in for a photograph…"
Technical Issues	Server "…image is taken from the camera and you submit it to the server, the server grabs it at the same time and there is like a conflict and then we would have to resend it and that was a work around we kind of	Data "Yeah it would hold the data sometimes if you hit the back button the data would still be there. I think there was one or two times that I had to start them again."

Table 5: Summary of Focus Group Findings

Theme/Category	Focus Group One Statement	Focus Group Two Statement
	knew about going into the study."	
Technical Issues	Processing "…there was a failure on three or four patients where the study would not go to the viewing workstation so we would have to manually copy those images over…"	Validate "Yeah there are required fields and there should be validations on the clients side that will catch incomplete fields before you go to submission its just a matter of how much development time there was before you can actually get it done so that is all going to be done for next time."
Images	Camera Artifacts "I did not analyze it officially but the quality I think in general was very good. Initially I identified some diabetes that probably wasn't there which were probably just artifacts in the camera lens. When I realized several patients had the same artifacts you know every camera has some artifacts I think and you have to get to know what is in your camera and so on."	Shadows "…the one camera to the right we had a couple of problems with it but I think because of the light we got a lot of shadows. The other camera was in the back and it was a little darker area so those images are probably better."
Images	Contrast and Brightness "…there are always some images where you can see half the image very well and half is in a cloud and I think some of those if we get some software which Steve is going to give me that will improve contrast and brightness I would probably get a little bit more out of that and I would be pretty comfortable."	

Table 5: Summary of Focus Group Findings

Theme/Category	Focus Group One Statement	Focus Group Two Statement
Images	Linking Follow up "I was very pleased to see software I would click on the name and the images would come up not as thumbnail which I would have preferred but just as a link and then I could go through those pretty quickly. Then I would enter and answer ASAP, three months, six months or one year which was what our bottom line of result was not to issue a diagnosis but to issue a recommendation for follow up."	
Staffing Needs	Another Staff Person "Of all the stations we probably would have had another person on the viewing end on the consultation part there wasn't anyone qualified to do that and technically we couldn't accommodate that person either."	Sufficient Staff "I think the number of people on each station seemed to be just right, three for registration, three consent, two photographers I think Dr. Eller could use some help on grading."
Staffing Needs		Team Work "One thing also I wanted to mention I think everyone worked as a great team. From a distance if you backed off it looked like everything was really smooth but I thought maybe a person could be like a coordinator for the whole thing there was not one person that if there was a problem

Table 5: Summary of Focus Group Findings

Theme/Category	Focus Group One Statement	Focus Group Two Statement
		you could go to. All of us were doing little parts but there wasn't one person and I think that might have helped."
Staffing Needs Layout		Extra Help "One of the issues in location I had to until Gerri Weiss realized I needed help every time I would talk to someone then I would have to stand up and walk around the corner and find another person and escort them back and then eventually they just stood in front of me and ready for another one?"
Subjects	Medical Knowledge "I had people pulling out their bottles for me." "Yeah you are going to get people that know off the top of their head, people that carry it around with them and then people who have no idea what they problem is they are taking the medication for.."	Education "I think that is the thing that really fascinates people they want to be educated they want to know what we are looking at and they also want to learn how does diabetes affect your eyes."

Improvement Suggestions

1. Have more training time in tablet use.
2. Use label maker to identify forms.
3. Prepare and carry complete list of supplies, or operation manual.
4. Have someone in charge to oversee operation.
5. Have schedule for breaks and lunch and have a person who can fill in.
6. Provide a queue for subjects.
7. Numbering system for subjects.
8. Keep track of refusals.
9. Highlight subjects graded already.
10. Allow subjects to sit in "darker" area before imaging.

D. SIMULATION TRAINING IN MILITARY MEDICINE

Agenda - Simulation Training in Military Medicine
May 9-11, 2005
APMMC, Hanoi, Vietnam

Day 1: Simulation and Training 1, Monday, May 9th, 90 minutes
Lawrence Burgess, **MD, Moderator**

Simulation Training Overview	***Lawrence Burgess, MD***	*15* min
	Q&A	*5* min

Training landscape and problems: no dollars, personnel, must build curriculum, etc.,
Proposed solutions: local approaches; enterprise approaches
Reviews types of training: (mannequins: part vs. full task trainers, immersive virtual reality.
Difference between cognitive vs. procedural (gross motor and/or fine motor) vs. integrated types like mannequin for gross motor or immersive virtual reality for fine motor
Intro: Actual training is 70%, but must have curriculum and back-end for data collection of training results.

Overview of Tools for Training: Cognitive and Integrative Training with MicroSim and SimMan	***Alan Morgan, MD***	*30* min
	Q&A	*5* min

- Cognitive training through MicroSim
- Integrated training through SimMan

Overview: WISER Approach to Simulation Training		
	John Schaefer, MD	*30* min
	Q&A	*5* min

- Center approach to training students, workforce
- Developing champions in your faculty (course directors and facilitators)
- Funding for Center
- Web-based curriculum for pre-training and bedside (mannequin-side) teaching
- Scheduling system, automated data collection to monitor training results

Day 2: Simulation and Training CI, Tuesday, May 90 minutes
Lawrence Burgess, **MD, Moderator**

Military Medical Integrative Training	***Alan Morgan, MD***	*30* min
	Q&A	*5* min

- MicroSim and SimMan in US military medical training
- Training possible for a wide range of military health care providers from

medics to nurses to physicians.

Q&A *5 min*

On-line cur iculum
Pretest
Training
Immediate feedback, automated data gathering

SimMan DEMO - ***John Schaefer, MD*** 15 min
Q&A 10 min

*LUNCH - **Military Medicine Simulation Working Group***
(Open session, bring buffet lunch into designated conference room)
Alan Morgan, MD *75* min

Day 3 **Simulation and Training III, Wednesday,** May 11th, 4.5 hours
Lawrence **Burgess, MD, Moderator**

Continental Breakfast *0700-0730*

Opening Remarks ***Lawrence Burgess, MD*** *0730-0745*

Separation into 4 groups, 4 rooms
Scenarios 1-4 divided in groups of 10, rotating between 4 stations in 4 different rooms (including computer room).

-MicroSim (print certificates)	John Rodgers, Phil White
-Pre-hospital	Lawrence Burgess, MD
-ATLS type scenario	Alan Morgan, MD
-ACLS type scenario	John Schaefer, MD

Scenario 1 *0745-0900*

15-minute introduction to scenario and training goals
1 hour of multiple sessions with individuals rotating

Scenario 2 0900-1015

Break 1015-1030

Scenario 3 1030-1145

Scenario 4 1145-1300

Conclusion, *Certificates* 1300

E. WHMC SIMULATION COURSE CRITIQUE

Course Critique
Emergency War Surgery Course
7-9 November 2005
Wilford Hall Medical Center

Demographics

3 Physicians
14 Nurses (All nurses were not at the class the entire time.)
(11 completed the Nursing Breakout Labs Section)
1 PA
1 Medic
1 Civilian (Did not fill out an evaluation)

We solicit your input to evaluate the quality of the activity so that we can better classes in the future. Your input and feedback is pertinent for us to be able to provide courses that will help you to improve a practitioner.

I. Overall quality of the activity. On a scale of 1 to 5, with 1 meaning "Strongly Disagree" and 5 meaning "Strongly Agree" rate the following components regarding the activity as a whole.

	Responses	Average
1. The physical facility used was appropriate.	16/18	4.8
Comments:		
- *Moving rooms confusing*		
2. The subject/topic met my learning needs.	16/18	5
War Wounds		
Presenter expertise was apparent.	17/18	4.8
I achieved the topic objectives.	17/18	4.8
Teaching strategies were appropriate.	17/18	4.8
Battle Trauma Systems.		
Presenter expertise was apparent.	18/18	4.8
I achieved the topic objectives.	18/18	4.8
Teaching strategies were appropriate	18/18	4.8
Shock and Resuscitation		
Presenter expertise was apparent.	18/18	4.8
I achieved the topic objectives.	18/18	4.8
Teaching strategies were appropriate.	18/18	4.8

Field Critical Care and Thermal Injury		
Presenter expertise was apparent.	17/18	4.7
I achieved the topic objectives.	17/18	4.7
Teaching strategies were appropriate.	17/18	4.7
Face, Neck and Ocular Injuries		
Presenter expertise was apparent.	18/18	4.8
I achieved the topic objectives.	18/18	4.8
Teaching strategies were appropriate.	18/18	4.8
Head Injury		
Presenter expertise was apparent.	18/18	4.8
I achieved the topic objectives.	18/18	4.9
Teaching strategies were appropriate.	18/18	4.9
Triage Scenarios		
Presenter expertise was apparent.	18/18	4.8
I achieved the topic objectives.	18/18	4.8
Teaching strategies were appropriate.	18/18	4.8
Balad Deployment/Case Discussion		
Presenter expertise was apparent.	18/18	5
I achieved the topic objectives.	18/18	5
Teaching strategies were appropriate.	18/18	5
Damage Control Concepts		
Presenter expertise was apparent.	18/18	5
I achieved the topic objectives.	18/18	5
Teaching strategies were appropriate.	18/18	5
Abdominal Injuries		
Presenter expertise was apparent.	18/18	5
I achieved the topic objectives.	18/18	5
Teaching strategies were appropriate.	18/18	5
Thoracic Injury/Exposures		
Presenter expertise was apparent.	18/18	4.9
I achieved the topic objectives.	18/18	4.9
Teaching strategies were appropriate.	18/18	4.8
Comments:		
- Was great		
Ultrasound		
Presenter expertise was apparent.	18/18	4.8
I achieved the topic objectives.	18/18	4.8
Teaching strategies were appropriate.	18/18	4.8

Combat Soft Tissue Injuries/Debridement

Presenter expertise was apparent.	18/18	5
I achieved the topic objectives.	18/18	5
Teaching strategies were appropriate.	18/18	5

Combat Extremity f\Fracture Management

Presenter expertise was apparent.	18/18	5
I achieved the topic objectives.	18/18	5
Teaching strategies were appropriate.	18/18	5

Combat Axial Fracture Management/Spinal/Pelvic Injuries

Presenter expertise was apparent.	18/18	5
I achieved the topic objectives.	18/18	5
Teaching strategies were appropriate.	18/18	5

Compartment Syndromes

Presenter expertise was apparent.	18/18	5
I achieved the topic objectives.	18/18	5
Teaching strategies were appropriate.	18/18	5

Peripheral Vascular Injuries

Presenter expertise was apparent.	13/18	4.9
I achieved the topic objectives.	13/18	4.8
Teaching strategies were appropriate.	13/18	4.8

Human Cadaver Labs

Presenter expertise was apparent.	18/18	5
I achieved the topic objectives.	18/18	5
Teaching strategies were appropriate.	18/18	5

Comments:

- *Required for course*
- *Very helpful*
- *Awesome learning experience*
- *Dr. Jenkins is awesome!*
- *Great review of anatomy and techniques*

Live Animal Salvage Lab

Presenter expertise was apparent.	18/18	5
I achieved the topic objectives.	18/18	5
Teaching strategies were appropriate.	18/18	5

Comments:

- *Personally did not find 1st breakout and CCATT equipment review helpful – familiar with equipment. All other labs were very good.*
- *Time was a little short*

- *It would have been nice to do one surgery on the animals. We could have used 1-2 more hours.*

Nursing Breakout Labs

Presenter expertise was apparent.	13/13	5
I achieved the topic objectives.	13/13	5
Teaching strategies were appropriate.	13/13	5

Comments:

- *Awesome experience!*
- *Nurse labs were helpful for hands-on review of learning*

3. The objective(s) was relevant to the overall purpose of the activity.	18/18	5
4. Handouts and other written materials were organized and useful to learning.	18/18	5

5. How has the course helped you to improve your skills as a medical practitioner/health care provider?

- *Great refresher for med-surgery nursing. Learned about new medical products.*
- *I gained cognitive. Psychological and hands-on skills*
- *Improved prep for deployment*
- *The cadaver and salvage lab skills*
- *Intro to trauma seen in field, cadaver lab was phenomena*
- *Good review of med-surg s/cells – especially labs*
- *Reminder of how equipment is used*
- *Very practical application to work required in balad*
- *Helped to review items relevant to deployment techniques that I have not used recently*
- *Yes*
- *Insight into the type of wounds and techniques employed to care for combat casualties*
- *Very well done*
- *With hands-on experience with equipment and performing procedures on cadavers*
- *Good review as far as adult care in trauma setting*
- *This was such an EXCELLENT course. The deployment experience of every speaker certainly added to the richness of lectures!*
- *yes*

6. How much of this course was new material to you and if so, what portions?

- *War Trauma exposure*
- *50%*
- *Surgical techniques/repair*
- *Setting up for ICP monitoring and use of Codman machine*
- *Blast injuries, trauma, vascular injuries*
- *Most of the information was not new. However when presented was very informative – answered questions clarified myths and fallacies*
- *Tons*

- *None*
- *Some – expeditionary trauma applications*
- *Craniotomies*
- *Compartment syndrome and provides oriented discussions on surgical procedures*
- *Blast injuries*
- *Mixed new info and great refresher in trauma principles*
- *1/3*

7. Did you perceive that this course was fair, balanced and free of commercial bias?
   - *Yes, yes, yes, yes, yes, yes, yes, yes, yes, yes, yes, yes, yes*
   - *Yes, the course was fair, provide good amount of time for nursing breakout sessions. -*
   - *Did not notice commercial bias*
   - *Yes, and than the drug reps for the breakfasts and lunches (I have thanked them myself)*
   - *Yes, extremely fair!*
   - *yes*

8. What suggestions do you have for future offerings?
   - *Dr. Jenkins provided a wealth of knowledge. Should consider recording this course for individuals who cannot attend*
   - *Excellent*
   - *Triage scenarios – please pass out paper with patient info, it is much better that taking notes and trying to remember each patient*
   - *Be sure folks know that WHMC cannot provide supplies for the whole theater*
   - *Awesome course – very professionally done*
   - *Absolutely keep offering this course for those deploying*
   - *Great food too!*
   - *Well done – very valuable for Nursing! Thanks Rose!*
   - *Should be a 5-day course- with nursing and skill labs; Excellent course; Would recommend all deploying to attend*
   - *Skill competency stations*
   - *Would be optimal to have all of the AF deployers do the course together. The MD's and nurses should do the same things together and same things apart as was done in this course*
   - *Academic discussion between surgeons on a specific topic of surgical techniques should be saved until <u>after</u> the lectures*
   - *More tips for nurses fro physicians on how best to assist physicians during their procedures and what to look for when assessing patients. Compartment syndrome discussion was very helpful*
   - *Tour of Trauma Bay – chance to see some equipment on live patients. This is the BEST trauma course I have ever had!*
   - *Offer to technicians*